REMARKS

In view of the preceding amendments and following remarks, reconsideration of the present application is respectfully requested.

Claims 1-14 were pending in the Application, and were rejected. Claims 1-8 are amended herein. No new matter is believed to be introduced by these amendments.

Claim 6 was objected to under 35 USC 112, second paragraph. The lack of antecedence for "said physical measurement" has been corrected by changing its dependence to Claim 5.

Claims 1-3 and 6-12 were rejected under 35 USC §103(a) as being unpatentable over Gustafson (6,050,622), in view of Soehnlen (2002/0067264 A1). Claims 4-5 and 13-14 were rejected under 35 USC §103(a) as being unpatentable over Gustafson (6,050,622), in view of Soehnlen (2002/0067264 A1), and in further view of Egli, et al. (2004/0245205 A1).

Gustafson discloses a safety sealing device that embeds a chip and an antenna in a glue-together tape or bottle cap. Its functioning in detecting tampering depends on the antenna winding being broken when the cap or tape is tampered with. Soehnlen, and Egli, et al., are similar in operation. The chip cannot respond properly to an interrogator when its antenna has been broken. Gustafson, Soehnlen, and Egli, et al., do not recognize a practical problem in implementing such devices with ordinary polymers and glues. Gustafson teaches only that the device must be "strongly glued" without providing any specifics how to do that good enough.

The critical thing in Claims 1-14 that most differentiates from the cited prior art is the "thermosetting cross-linked polymers". Such do not soften and stretch with heat, and they cannot be re-glued without there being obvious signs of rejoining. Claims 1-8 have been amended to make these distinctions very clear and precise.

The polymerization of the monomer compounds produces very strong chemical bonds between the long chain molecules by the process of radiation, or chemical cross-linking. Once sufficiently crosslinked, these become polymer, e.g., chemical springs that remember the original physical parameters of the product at the time it is crosslinked. Such can then be heated above its normal melting point and yet will continue to rigorously maintain it solid appearance and not melt. While at, or above the glass transition point temperature, T_g, the polymer can be physically reshaped, expanded, or compressed. If it's then cooled below T_g while in the new shape, it will "freeze" until the T_g of the polymer material is once again encountered. The polymer will insist on returning to the original shape and size at the time of crosslinking.

Another benefit of the crosslinking process, is that it produces chemical and physical changes in the base polymer that make the finished compound highly resistant to attack by solvents. Additionally, since the crosslinking of the loose spaghetti like strands of polymer chains are linked together as part of the crosslinking process at the same active and available sites on the molecules, that would normally be used as part of the "gluing or bonding" process that a counterfeiter might use, these crosslinked polymers are extremely difficult to re-bond

together, even by the most tenacious chemical bonding agents such as cyanoacrylates or "crazy-glue-type compounds.

Crosslinked compounds can be heated above their T_g, and expanded to a size that is very close to the ultimate maximum elongation for that compound. If physically stretch beyond this point, the polymer chains will tear, shatter, or simply crumble into individual non-workable clumps of fractured polymer chains. So, a part is preferably made significantly smaller than needed, crosslinked in the smaller size, and then heated above its T_g and freeze it at this point near its maximum polymer elongation. If a counterfeiter comes along and attempts to heat the product to stretch it off a product without breaking the tamper evident seals, they are going to find that the more they heat the product the stronger the product will fight to return to it original smaller shape and size, If they heat it too much, the material will degrade and crumple. If they exert too much physical force on the heated polymer, it will tear, fracture, or visually become tamper evident.

If a typical adhesive, glue or non-crosslinked polymer were used to attach an antenna to a product to create a tamper evident bond, counterfeiting such products is very easy to do with the application of heat, cold, or numerous solvents which can soften, swell, or even dissolve almost all non-crosslinked polymer compounds.

In general, the claimed present invention differs from conventional devices in its component materials, antenna design, and security encryption. It is common practice to find polymers used in the construction of bottle caps and security seals in many industries and applications. The cited prior art exemplifies such. The problem with

the prior art is that it is all too easy to heat a polymer cap with a hot air gun or hair dryer hot enough to soften the polymers to the point it is possible to slip off the cap without breaking the tamper evident seals. Such a cap can therefore be replaced with no visible indication that the product had ever been tampered with. Only with a few polymers is it not possible to re-assemble broken tamper guard style seals and hide the damage, simply by using a drop of cyanoacrylate (crazy glue) to hold the pieces in place.

All polymers tend to creep, stretch, and move over time. When they are stored at elevated temperatures, this movement is substantial, visible in many cases, and ALWAYS will occur with the polymer moving away from the point of stress. If a polymer cap is screwed, or snapped down as tight as possible, the polymer will immediately try to relax away from the stress point and no matter what force is placed on the seal at time of closure, the retained seal force will always decrease over a given time. Even when exposed normal shipping temperatures over a few days, the seal integrity can be compromised and breached..

Embodiments of the present invention use a "crosslinking" process originally for developed for the manufacture of heatshrink tubing. Crosslinked polymers are sometimes referred to as intelligent polymers. All polymers are made up of very long chemical chains that are loosely held together. This is what gives these polymers the plastic effect of being flexible and easily molded. Crosslinking by chemical or radiation stimulus produces very strong welds or bonds between the otherwise flexible polymer chemical chains locking them together.

Once a polymer part has been sufficiently cross-linked, the material can be heated past its normal melting point and stretched or expanded. When cooled in this stretched or expanded state, a crosslinked polymer product will stay in the expanded state almost indefinitely, or until it is once again exposed to a temperature near its original melting point. The material will then retract back to its original size and shape, with much greater force and material strength.

A cap or product, can be purposefully made undersized for an intended application and crosslinked in this smaller configuration. It is then heated past its (original) melting point, expanded into its new shape and applied. When it cools, it locks into this new shape. The product essentially becomes a chemical polymer spring which will fight to pull the product back to it's original smaller size and shape, if and when it is exposed to elevated temperatures near its melting point of the compound. Any creep or movement of the polymer part over time, will always be towards the direction of its original shape. The trick is to design the part and expanded shape, such that the full force of the polymer chain (chemical-springs) are always pulling towards the point of desired stress and not away from it. By using this process, a sealed cap or part actually gets stronger, rather than weaker over time as it is exposed to elevated temperatures.

If, for example, a individual were to attempt to tamper with the product by heating it to slip it off a bottle, the seal and part will strengthen as it is heated, and try forcibly snap back into it smaller shape and size.

An antenna attached to an RFID chip and tuned so that the RFID chip can be interrogated and read, is conventional. Without tuning the antenna to the chip, no signal will be achieved and you do not have a product.

Looking for a signal from a chip as an indicator of tampering is very limited in scope and application. The interrogation-response, communication, and authentication, is needed to know how, when, and where the product was tampered with. Or if it really was just a lost device, or a routine manufacturing defect. Simply reading and writing information from an RFID chip and antenna to a batch file in a computer is only one step up from a pad of paper and a pencil used to count products entering and leaving a warehouse.

Soehnlen describes a tamper evident package as including an antenna which is "disabled by a breech of integrity", a broken antenna wire. Gustafson an interactive RFID product that goes dead if the antenna is broken or if the integrity of the membrane parts are breeched. The methods taught by Gustafson are extremely cost and space prohibitive. Building a product smaller than 1" diameter would be difficult. Implementing such a cap in production with its switch settings, electromechanical contacts, barbs, pre-stressed metallic parts is problematic. In some cases such must be installed, removed, and then re-installed for the product cap to function properly. The membrane must have two parallel flat parts arranged to move axially in relation to each other. The device is operated by the axial movement between the circular parts etc.

Accordingly, in view of the preceding amendments and remarks, it is respectfully submitted that the pending application, with pending Claims 1-14, is in condition for allowance and such action is respectfully requested.

Should the Examiner be of the opinion that a telephone conference with Applicant's attorney would expedite matters, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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